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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/803,958

03/19/2004

Toru Yoshie

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01/20/2006

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EXAMINER

NGUYEN, HA T

ART UNIT

PAPER NUMBER

2812

DATE MAILED: 01/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/803,958

Applicant(s)

YOSHIE, TORU

Examiner

Ha T. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 16 November 2005.  
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-22 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-22 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Notice to Applicant***

1. Applicants' Amendment and Response to the Office Action mailed 8-24-5 has been entered and made of record .

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103 and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-2, 4-5, 9-10, and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoi (USPN 6387824) in view of Havemann et al. (USPN 5661344, hereinafter "Havemann").

Referring to Fig. 1a-5 and corresponding text, Aoi discloses [Re claim 1] a method for manufacturing a semiconductor device said method comprising the steps of: forming an insulating film 21, 22 on a semiconductor base material 20, said insulating film being predominantly composed of organic siloxane and containing an organic component which has no chemical bond to said organic siloxane 9see Fig. 1b); and plasma treating said insulating film to remove said organic component and form a modifying layer 26 on a surface of said insulating

film; [Re claim 9] a method for manufacturing a semiconductor device said method comprising the steps of: forming an insulating film on a semiconductor base material said insulating film being composed organic siloxane; and applying plasma treatment to said insulating film to remove an organic group from said organic siloxane and form a modifying layer on a surface of said insulating film (see embodiments 3 and 6); [ Re claims 2 and 10] including forming said insulating film by a chemical vapor deposition (see col. 8, lines 58-65 and col. 11, lines 30-38); [Re claims 4 and 12] wherein said plasma treatment is performed using a gas containing at least one selected from the group consisting of oxygen, hydrogen and nitrogen (see col. 9, lines 4-12 and col. 12, lines 10-24); [Re claims 5 and 13] wherein molecules of said organic siloxane contain an alkyl group or an allyl group (see col. 11, lines 39-58); the examiner interpreted that the alkyl group comes from methyl group of vinyltrimethoxysilane; and [Re claim 14] wherein said organic siloxane is a phenyl methyl siloxane (see col. 9, lines 39-53).

But it fails to disclose expressly forming a silicon oxide film on said modifying layer.

However, the missing limitation is well known in the art because Havemann discloses this feature (See col.6, lines 24-36).

A person of ordinary skill is motivated to modify Aoi with Havemann to fabricate devices using standard dielectric of a conventional process .

Therefore, it would have been obvious to combine Aoi with Havemann to obtain the invention as specified in claims 1-2, 4-5, 9-10, and 12-14.

4. Claims 1, 3-9, 11-13, 15-17, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Han et al. (USPAPN 20020102413, hereinafter “Han” in view of Havemann).

[Re claim 1] Han discloses a method for manufacturing a semiconductor device said method comprising the steps of: forming an insulating film on a semiconductor base material, said insulating film being predominantly composed of organic siloxane and containing an organic component which has no chemical bond to said organic siloxane (see par. 26-31); and plasma treating said insulating film to remove said organic component and form a modifying layer on a surface of said insulating film (see par. 33); [Re claims 3 and 11] wherein forming said insulating film includes coating said semiconductor base material with an insulating film composition containing said organic siloxane and said organic component; and heat treating said

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insulating film composition at a temperature between 100 and 200C (see pars. 29-30); [Re claim 4 ] wherein said plasma treatment is performed using a gas containing at least one selected from the group consisting of oxygen, hydrogen and nitrogen (as shown above); [Re claims 5 and 13] wherein molecules of said organic siloxane contain an alkyl group or an allyl group (see pars. 26-27 and 41-42); [Re claim 6] wherein said organic siloxane is methyl silsesquioxane, MSQ (see par. 23, 26); and [Re claims 7, 15, 17, and 20] after said plasma treatment, heat treating said insulating film at a temperature between 250 and 450C; [Re claims 8 and 16] after said plasma treatment, heat treating said insulating film at a temperature between 400V and 450V (see pars. 39-40);

[Re claim 9] a method for manufacturing a semiconductor device said method comprising the steps of: forming an insulating film on a semiconductor base material said insulating film being composed organic siloxane (see pars. 26-31; and applying plasma treatment to said insulating film to remove an organic group from said organic siloxane and form a modifying layer on a surface of said insulating film (see Par. 33) (the examiner interpreted that in the case where the plasma treatment is not complete, only a top portion of the insulating film is modified); and [Re claim 12] wherein said plasma treatment is performed using a gas containing at least one selected from the group consisting of oxygen, hydrogen and nitrogen (see par. 35).

But it fails to disclose expressly forming a silicon oxide film on said modifying layer.

However, the missing limitation is well known in the art because Havemann discloses this feature (See col.6, lines 24-36).

A person of ordinary skill is motivated to modify Han with Havemann to fabricate devices using standard dielectric of a conventional process.

Therefore, it would have been obvious to modify Han with Havemann to obtain the invention as specified in claims 1, 3-9, 11-13, 15-17, and 20.

5. Claims 18-19 and 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoi or Han in view of Havemann, as applied above, and further in view of Olsen et al. (USPN 6528426, hereinafter "Olsen").

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The combined teaching of Aoi or Han and Havemann discloses substantially the limitations of claims 18-19 and 21-22, as shown above. It also discloses the use of plasma comprising oxygen (see Aoi, col. 7, lines 5-14 or Han, pars. 35, table 1 ).

But it fails to disclose expressly plasma treating in oxygen ambient.. The examiner interpreted this limitation to mean a oxygen-predominant ambient.

However, the missing limitation is well known in the art because Olsen discloses plasma treatment can be in hydrogen or oxygen ambient (See col. 4, lines 8-23). When the plasma treatment is in oxygen ambient the modifying layer is inherently hydrophilic since the same gas is used as that of the claimed invention.

A person of ordinary skill is motivated to modify Aoi or Han and Havemann with Olsen to obtain .

Therefore, it would have been obvious to combine Aoi or Han and Havemann with Olsen to obtain the invention as specified in claims 18-19 and 21-22.

### ***Response to Amendment***

6. In view of amendment to the claims, the rejection of the claims under 35 U.S.C. 102 or 103, as stated in the Office Action indicated above, has been withdrawn.

In view of the new ground of rejection, applicants' arguments have been rendered moot.

### ***Conclusion***

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for response to this final action is set to expire THREE MONTHS from the date of this action. In the event a first response is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event will

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the statutory period for response expire later than SIX MONTHS from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ha T. Nguyen whose telephone number is (571) 272-1678. The examiner can normally be reached on Monday-Friday from 8:30AM to 6:00PM, except the first Friday of each bi-week. The telephone number for Wednesday is (703) 560-0528.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael S. Lebentritt, can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

HN

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Ha Nguyen  
Primary Examiner